I have finally to express my great obligations to Messrs. Fowler, Taylor, and Richards, who have helped me in various ways in the researches embodied in this paper. Mr. Fowler, the assistant to the Solar Physics Committee, has made most of the observations on meteorites, and low-temperature spectra generally, which have been recorded on the maps, and he has carried out this work with a care, skill, and patience beyond all praise. The observations have in nearly every case been checked also by myself. Mr. Taylor, the Demonstrator of Astronomy, has been chiefly responsible for looking up the literature and mapping the results, in which he has been aided by Mr. Richards.

J. NORMAN LOCKYER.

SIR JULIUS VON HAAST, F.R.S.

SCIENCE in Australasia, and especially in New Zealand, has recently sustained a great loss by the death, on August 16 last, of Sir Julius von Haast. He was born on May 1, 1824, at Bonn, where his father was a wealthy merchant. After passing through the grammar-schools of Bonn and Cologne, he entered the University of Bonn, and devoted a considerable portion of his time to geological and mineralogical studies. He then spent some years in France, and made journeys for the purpose of scientific exploration in Russia, Austria, and Italy. Being invited by an English firm of ship-owners to visit New Zealand on their behalf in order to report upon its fitness as a field for German emigration, he went to London, and accepted their offer after some negotiation; and on December 21, 1858, he arrived at Auckland. The next day, by a lucky chance, the Austrian ship *Novara*—then on its voyage of scientific research—put into Auckland; and when Dr. von Hochstetter was left behind, at the request of the New Zealand Government, he took Mr. Haast as his lieutenant and companion in all his journeys in these islands. After the departure of Hochstetter, Mr. Haast was engaged by the Provincial Government of Nelson to explore the west coast of the province, and in the journey undertaken in the pursuit of these duties he commenced his examination of the physical geography and geology of the Southern Alps. The results of the exploration were published in a report printed by the Nelson Government and dated January 1, 1861.

Immediately after the conclusion of the Nelson journey—namely, in December 1860—he undertook to report to the Government of the Province of Canterbury as to the possibility of constructing a tunnel through the hills which separate Christchurch from its port of Lyttelton; and in the following year he was appointed to the command of the Geological Survey of Canterbury, being thus the first Government geologist in New Zealand. It was in this capacity that he accomplished the most valuable part of his scientific work. The most striking of his achievements were the examination of the Mount Cook district; the sketching and mapping out of the great glaciers of the Southern Alps, named by him the Tasman, Franz Joseph, Hochstetter, Hooker, and Müller glaciers, and many others; and the forecast and subsequent examination made of the auriferous districts of Westland. All this, with the geographical, zoological, botanical, and meteorological researches carried on side by side with the more exclusively geological work, was in continuation of what had been done in the Nelson or northern portion of the same mountain system. The results of his investigations were set forth in the chief book published by him—namely, "The Geology of Canterbury and Westland." He was also the author of many papers in scientific periodicals.

Last year he acted as New Zealand Commissioner at the Indian and Colonial Exhibition. Afterwards he visited Paris, Brussels, Berlin, Dresden, Vienna, Halle, Venice, Florence, and other centres, obtaining a vast number of things for the Canterbury Museum, the flourishing condition of which is mainly due to his energy and zeal. His labour in connection with the Exhibition, and the subsequent wear and tear of travelling while in weak health, appear to have overtaxed his strength, and he died of heart-disease a month after his return to New Zealand.

NOTES.

THE fourth session of the International Geological Congress will be held next year in London. The Congress was founded at a meeting of the American Association for the Advancement of Science at Buffalo in 1876, the first session being held at Paris in 1878, the second at Bologna in 1881, the third at Berlin in 1885. The following is a list of the Organizing Committee appointed to carry out the arrangements:—H. Bauerman, W. T. Blanford, F.R.S., Rev. Prof. T. G. Bonney, F.R.S., Prof. W. Boyd Dawkins, F.R.S., John Evans, F.R.S., Prof. W. H. Flower, F.R.S., Arch. Geikie, F.R.S., Prof. James Geikie, F.R.S., Sir Douglas Galton, F.R.S., Prof. A. H. Green, F.R.S., Rev. Prof. S. Haughton, F.R.S., Prof. T. H. Huxley, F.R.S., W. H. Hudleston, F.R.S., Prof. T. McK. Hughes, J. W. Hulke, F.R.S., Prof. E. Hull, F.R.S., Prof. J. W. Judd, F.R.S., Prof. J. Prestwich, F.R.S., F. W. Rudler, H. C. Sorby, F.R.S., Sir W. W. Smyth, F.R.S., W. Topley, Rev. Prof. Wiltshire, Henry Woodward, F.R.S. The duty of this Committee will be to nominate the officers, to appoint Executive Committees, and to fix the exact date of meeting. The Congress at Berlin requested that the meeting should be held in London between August 15 and September 15.

DR. DAWSON, Assistant-Director of the Canadian Geological Survey, who headed the party sent by the Dominion Government to explore the country adjacent to the Alaska boundary, has returned to Victoria. Two of his party, Messrs. Ogilvie and McConnell, will winter in the district, preparing the way for the establishment of the international boundary. The Expedition so far has secured a great deal of geological, geographical, and general information about the country, which is far from being the Arctic region it is sometimes represented to be. The point from which Dr. Dawson turned back was at the junction of the Lewis and Pelly Rivers. It is 1000 miles north of Victoria. There the flora was found to differ but little from that on the banks of the Fraser. A great deal of open grassy country exists along the stream's tributary to the Yukon. No areas of tundra or frozen swamps, such as are to be met with in the interior of Alaska, were discovered by the Expedition. Dr. Dawson's conclusion is that the whole country, from Cassiar to the vicinity of Forty-mile Creek on the Yukon River (which must be near the eastern boundary of Alaska), yields more or less gold in placer deposits. This would constitute a gold-bearing region fully 500 miles in length, and of indefinite width.

AT a meeting of the Council of University College, Bristol, held on Wednesday, November 16, it was decided, at the suggestion of the staff of the College, to suspend for a year the office of Principal. Prof. Lloyd Morgan was in the meantime appointed academical head of the College, and Chairman of the Educational Board, with the title of Dean.

AT the Royal Institution, Sir Robert Stawell Ball, the Astronomer-Royal of Ireland, will give a course of six lectures (adapted to a juvenile auditory) on Astronomy: the Sun, Moon, Planets, Comets, and Stars. The course will begin on December 27. Courses of lectures will also probably be given by Lord Rayleigh (Professor of Natural Philosophy at the Royal Institution), Dr. G. J. Romanes, Mr. Hubert Herkomer, Prof. C. Hubert H. Parry, the Rev. W. H. Dallinger, and Mr. William Archer.

WE are requested to state that the lectures to be given on behalf of the Anthropological Institute by Mr. Francis Galton—which were postponed in consequence of that gentleman's indisposition—will be delivered in the Lecture Theatre of the South Kensington Museum on Saturday, the 26th inst., and the two following Saturdays, December 3 and 10.

AN International Exhibition will shortly be held by the Ornithological Society at Berlin.

A MAGNETIC Observatory is about to be erected near the Solar Observatory, on the Brauhausberg, near Potsdam.

A CORRESPONDENT writes to us from Venice that on the 9th inst. an earthquake occurred there at 1.32 a.m. There were five gentle undulations, which lasted ten seconds. On the same morning—at 1.30 a.m.—a shock at Ferrara is said to have lasted seven seconds.

THE other day Mr. Ruskin sent to the *Times* the following extract from a letter, dated November 14, which he had received from a friend at Florence:—"We had an earthquake this morning, which frightened everybody, and my door shook so that I thought somebody was trying to break in, and then there was a terrible noise, but I believe no harm done. The bells rang of themselves at the Carmine, and some say that one or two chimneys fell, but nobody seems to know." From a report issued by Signor Passerini, Director of the Meteorological Observatory connected with the Agricultural College of Scandicci, we learn that three shocks were felt there on the 14th, the first taking place about 5.20 a.m. It was accompanied by a rather loud rumbling, and was powerful enough to shake all the furniture in Signor Passerini's room. A second shock, weaker, and not accompanied by rumbling, was felt about twenty minutes later. At 6.49 a.m. the third shock, the strongest of all, and accompanied by loud rumbling, was felt. During the continuance of this shock people in the open country saw trees much shaken, and quantities of leaves were observed to fall. The direction of the shocks was from north-north-west to south-south-east.

AT the suggestion of Prof. Mushketoff, who has just returned from his official visit to Semiretchia, a special Commission has been appointed to watch the course of any earthquakes that may happen, and to report on them, in those parts of the Russian Empire which are most frequently visited, such as the Caucasus, Turkestan, and the Transbaikal region.

ADVICES from Baku state that a naphtha spring has burst forth near the town of Balachany, the oil being thrown to a height of over 100 feet and carried away long distances by the wind. Sometimes the oil falls like rain over the adjacent districts, and forms small streams, whilst heavy naphtha gases fill the air.

ANOTHER contribution to the subject of photography in colours is published by Mr. Carey Lea in the November number of the *American Journal of Science*. Although the interpretations placed upon his former experiments have not received universal acceptance in this country, still the experiments themselves have been generally received with considerable interest and surprise, and indeed are at the present time being repeated and considerably extended in more than one English laboratory. The appearance of another communication from Mr. Carey Lea is therefore most opportune, and will doubtless form the subject for considerable discussion. It will be remembered that the so-called photo-salts of silver, a description of which appeared in these columns a few months ago, were said to consist of combinations of ordinary chloride of silver with small quantities of subchloride. Mr. Carey Lea now finds that silver chloride combines with small quantities of many other chlorides, besides its own subchloride, to form coloured salts, comparatively stable and remarkably less sensitive to light. Thus if silver nitrate be added to a solution of ferric chloride in presence of free hydrochloric acid, the precipitate obtained is buff-coloured, and the ferric chloride carried down by the silver chloride cannot be washed out even by hydrochloric acid. The most remarkable property of this silver-ferric chloride is that it is almost unacted upon by light. Chlorides of cobalt, nickel, manganese, and mercury give analogous combinations, each having a characteristic colour. As those chlorides, such as ferric and mercuric, which readily part with one equivalent of chlorine, act most energetically in reducing the sensitiveness, it appears probable that the traces of chlorine thus capable of being given up, simply hold in check the commencement of the movement towards reduction.

WE have received from Mr. Stewart Culin the reprint of a paper read by him before the Anthropological Section of the American Association at its meeting at New York during the past autumn. It is entitled "China in America: a Study in the Social Life of the Chinese in the Eastern Cities of the United States," and describes the special districts in Southern China from which the immigrants mostly come, the guilds and associations they form, their mode of life, their pleasures, which are somewhat few and simple, and much else in respect to them that is of a very interesting character. His own contact with the Chinese in the United States leads him to form a favourable estimate of their character and attainments, which have been the subjects of much misconception. They are not "the dregs of the people, given up to gambling and opium-smoking, and distinguished only by their vices," as the anti-Chinese orators aver; nor are their mental and moral qualities quite so high as others allege. But we fear very much that Mr. Culin is over sanguine in the anticipation that the returning emigrants will some day carry enlightenment to their own country. Their work is not of a kind that enables them to acquire very great knowledge of the resources of the West; they come with a special object, viz. the acquisition of a competence, they toil unremittingly until that is attained, when they speed home again, usually with no very pleasant memories of the land of their sojourn. To China herself we must look for the elements of her regeneration, and time, which is the great solvent, will have its slow effect on that huge mass of humanity.

THE German publisher, Herr Trewendt, of Breslau, has just issued the twentieth part of a Dictionary of Zoology, Anthropology, and Ethnology; the twenty-fourth and twenty-fifth parts of a Dictionary of Chemistry; and the twentieth part of a hand-book of Botany. These works belong to the elaborate "Encyklopædie der Wissenschaften," edited by Dr. W. Förster, Dr. A. Kenngott, Dr. A. Ladenburg, and other scientific writers.

PROF. FOREL is at present studying the penetration of light into the Lake of Geneva, by means of the photographic effect on chloride of silver paper. Six photographic apparatus are attached one above another to a rope at 10-metre intervals. They are let down into the lake after sunset, left there one day or more, and taken up again at night. The depth-limit of absolute darkness has been found this year, in the beginning of March, 100 m.; of May, 75 m.; and of July, 45 m. Prof. Forel hopes to carry on these experiments for a whole year, every two months, and so obtain the curve for penetration of light into the lake.

THE loss of electricity by a conductor in moist air has been lately studied by Signor Guglielmo (Turin Academy). He finds that with potentials less than 600 volts, moist air insulates as well as dry air, but with higher potentials, there is more loss in moist air, and more the moister the air, and the higher the potential. The potential at which the difference becomes perceptible is the same for a ball as for a fine point. It occurs with extremely smooth surfaces, and so cannot be attributed to discharges in consequence of roughness of surface. With equal potential the loss of electricity has the same magnitude, whatever the dimensions of the balls used as conductors. In air saturated with vapours of insulating substances, the loss of electricity of a conductor is nearly the same as in dry air.

THE large Russian ironclad *Tchesme*, now being finished at Sebastopol, and having a displacement of over 10,000 tons, is to have boilers heated with petroleum. If the results correspond to what the Sebastopol engineers expect, the example is likely to be followed elsewhere. In this connection we may note an account in *La Nature* of November 5, of a gas-boat, as it may be called, the *Volapuk*, recently constructed by M. Forest, in which a gas-engine of six horse-power is driven, not by coal-gas, but by air charged with carbureted hydrogen, by passage through petroleum-oil. There are two pistons, and the explosive mixture is ignited by means of a spark from a magneto-electric arrangement. The engine consumes six litres of petroleum-oil per hour, giving a speed of sixteen kilometres per hour.

AMONG the various uses of celluloid, it would appear (according to the *Annales Industrielles*) to be a suitable sheathing for ships, in place of copper. A French Company now undertakes to supply the substance for this at 9 francs per surface-metre and per millimetre of thickness. In experiments by M. Butaine, plates of celluloid applied to various vessels in January last were removed five or six months after, and found quite intact and free from marine vegetation, which was abundant on parts uncovered. The colour of the substance is indestructible; the thickness may be reduced to 0·0003 metre; and the qualities of elasticity, solidity, impermeability, resistance to chemical action, &c., are all in favour of this use of celluloid.

THE following interesting observations with regard to the mobility of loess have been made by M. Potanin during his last journey through the region south of the Ordos. As wind steadily moves the shifting sands, so also water steadily moves the loess, transporting it from higher to lower levels. The underground water which filtrates through the loess, begins by making in it a kind of cavern; then a circular crevice appears on the surface over the cavern, and a cylindrical vertical hollow, which soon becomes a deep well, is formed through the thickness of the upper layers of the loess. The whole surface of the loess deposits is dotted with such wells, very dangerous to cattle. By and by the formerly cylindrical well begins to extend in the direction in which the underground water flows, and a narrow ravine grows until it joins the main valley. Then masses of loess continually fall down into the ravine, increasing its width. The fall of these masses is favoured by the numerous crevices in the loess, and it is so frequent that natives warn foreigners not to approach the borders of a ravine. Of course the fallen masses are further dislocated by water, and the loess is thus steadily transported at a remarkable speed to lower levels.

HITHERTO it has been generally supposed that the glaciers of the Caucasus are far from having the same development as those of the Alps. It appears, however, from the last researches of Abich, that, although no glaciers of the Caucasus are as long as the Aletsch and Unteraar glaciers, or the Mer de Glace, there are a great many of them. From tables compiled by M. Smirnoff in a recent issue of the *Bulletin* of the Moscow Naturalists' Society, it appears that the average lowest levels of the Caucasus glaciers are: 2504 metres in the Elburz Chain; 2176 metres in the chain to the west of the Adai-kokh; 2266 metres in the high valley of the Ingur; 2898 metres on the eastern slope, and 2238 on the northern slope, of the Kazbek; from 2428 to 2658 metres in Daghestan; 2776 metres on the Great Ararat; and as much as from 3162 to 3194 metres on the Shah-dagh. Comparing these heights with those reached by the lower extremities of glaciers in other highlands, M. Smirnoff concludes that in the main Caucasus ridge the altitudes of the snow-line and the glaciers are intermediate between the corresponding altitudes in the Alps and those in the chains of Central Asia (Thian Shan and Hindu Kush); and that in the western parts of the Caucasus the altitudes of the perennial snow-line are nearer to those of the Austrian Alps. There is some analogy between West Caucasus and the Himalayas, inasmuch as the lowest limits of perennial snow in both chains are higher on the northern slope than on the southern.

A "PANORAMA-BIJOU" (or toy panorama), has been recently brought before the French Société d'Encouragement, by M. Benoist. It is meant to give a succession of connected views of photographed scenery, &c. Externally the instrument appears as a cylindrical case with a handle projecting from its curved surface. The observer looks through a lens, in the axis, towards a mirror inclined 45°, which reflects a panoramic view fixed round the interior of an inner cylinder which is rotated by clockwork. The back of the case is of ground glass, admitting diffuse light. The instrument may be found a suitable companion to the stereoscope on the drawing-room table.

FROZEN fish are now imported into France, and a Society formed in Marseilles for the purpose of developing the trade (the Société du Trident) has a steamer and a sailing-vessel engaged in it. The steamer *Rokelle* lately came into Marseilles with some 30,000 kilogrammes of frozen fish in its hold, the temperature of which is kept at 17° C. below zero by means of a Pictet machine (evaporating sulphurous acid). The fish are caught with the net in various parts of the Mediterranean and Atlantic. After arrival they are despatched by night in a cold chamber. Experiment has shown that fish can be kept seven or eight months at low temperature without the least alteration. These fish are wrapped in straw or marine Algæ, and have been sent on to Paris, and even to Switzerland.

AT the establishment of the National Fish-Culture Association, Delaford Park, the American char, *S. fontinalis*, spawned as early as October 15. The thriving capacity of these beautiful fish is becoming yearly more and more marked. Their rate of growth at Delaford has been extraordinarily rapid.

DR. R. BALTZER, Professor of Mathematics at Giessen University, died at Giessen on November 7. He was born January 27, 1818.

ON October 22 a monument to Prof. Oswald Heer was unveiled in the Zürich Botanical Gardens. The bust of the great Swiss naturalist has been executed in a masterly manner by Prof. Hoerbst.

THE additions to the Zoological Society's Gardens during the past week include fifty-nine Pleurodele Newts (*Molge walti*), seven Marbled Newts (*Molge marmorata*) from Spain, presented by the Lord Lilford, F.Z.S.; two Moufflons (*Ovis musimon* ♂ ♀) from Sardinia, two Barbary Wild Sheep (*Ovis tragelaphus* ♂ ♀) from North Africa, two South American Flamingoes (*Phœnicopterus ignipalliatus*) from South America, deposited; ten Silky Bower Birds (*Ptilonorhynchus violaceus*) from New South Wales, eight received in exchange, and two deposited; an African Wild Ass (*Equus tæniopus*) born in the Gardens.

OUR ASTRONOMICAL COLUMN.

AMERICAN OBSERVATORIES.—It is reported that the Dearborn Observatory of the Chicago Astronomical Society is to be removed to Evanston, Ill., the North-Western University at Evanston having made an advantageous offer with respect to it. A large astronomical Observatory is proposed to be erected in connection with the Lake Forest University, Governor Ross,